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REPORT
TO
THE HONOURABLE GORDON CHURCHILL
CHAIRMAN
THE COMMITTEE OF THE PRIVY COUNCIL
ON SCIENTIFIC AND INDUSTRIAL RESEARCH

BY

THE SPECIAL COMMITTEE APPOINTED TO REVIEW
EXTRAMURAL SUPPORT OF MEDICAL RESEARCH
BY THE GOVERNMENT OF CANADA

12 NOVEMBER 1959

REPORT

to

THE HONOURABLE GORDON CHURCHILL

Chairman,

THE COMMITTEE OF THE PRIVY COUNCIL

ON SCIENTIFIC AND INDUSTRIAL RESEARCH



"The conquest of disease, like the conquest of hunger, is at present primary to the people. The conquest of time, space, labour and materials for natural resources - even for peaceful prosperity - is secondary, for without a healthy population there could be empty victory to the nation."

by

J. R. Sizeman

THE SPECIAL COMMITTEE APPOINTED TO REVIEW

EXTRAMURAL SUPPORT OF MEDICAL RESEARCH

BY THE GOVERNMENT OF CANADA



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THE MEMBERS OF THE FOREWORD

On 14 October, 1957, the Association of Canadian Medical Colleges passed the following resolution, which was sent to the Prime Minister:-

"Resolved: That the Association of Canadian Medical Colleges, representing, through their Deans, the twelve medical schools of Canada, finds that Federal support for medical research is alarmingly inadequate to support those investigations which are now in hand, and those which, in the public interest, should be undertaken, and asks the Prime Minister to increase the funds available to the Medical Division of the National Research Council, in his first budget, by at least \$500,000."

Following the transmission of this resolution, and as a result of letters which passed between Dean L. G. Bell, President of the Association of Canadian Medical Colleges, the Prime Minister, and the Honourables the Ministers of National Health and Welfare, Veterans' Affairs, Trade and Commerce, and National Defence, the Hon. J. W. Monteith invited the Association to meet him and his colleagues in the Cabinet on 12 November. At this meeting Dean Bell presented a brief (Appendix A) stressing the paucity of funds available for medical research, the difficulties encountered in obtaining timely assurance of support, and the need of capital for the provision of research facilities. The brief reiterated the request for an immediate increase in the budget of the Division of Medical Research, and concluded: "It is respectfully requested that a high-level committee be set up at once to study these problems." The prompt action of the Government to meet this request was gratifying, for it indicated an appreciation of the importance of medical research to the welfare of Canada.

In February, 1958, the Hon. the Minister of Trade and Commerce, in his capacity as Chairman of the Privy Council Committee on Scientific and Industrial Research, named a Special Committee on Medical Research with the following terms of reference:-

"To review the procedure by which the Government of Canada supports medical research outside its own installations, and the extent to which this support is adequate, and to make recommendations for coordinating the programme of Departments of Government in this field."

The members of this Committee were:-

Dr. R.F. Farquharson, Chairman, University of Toronto
Dr. D.E. Cameron, McGill University
Dr. D.H. Copp, University of British Columbia
Dr. J. Doupe, University of Manitoba
Dr. G.H. Ettinger, Queen's University
Dr. R. Gingras, Laval University
Dr. E. Robillard, University of Montreal
Dr. C.B. Stewart, Dalhousie University

The President of the National Research Council was asked to convene its first meeting.

Activities of the Committee

The Committee has held thirteen meetings. It has interviewed and obtained from officials of the National Research Council and of the Departments of Government which give grants for medical research, statements concerning the programmes of research in which they are interested:-

National Research Council

Dr. E.W.R. Steacie, President
Dr. J.B. Marshall, Awards Officer

Department of National Health and Welfare

Dr. G.D.W. Cameron, Deputy Minister of Health
Dr. B.D.B. Layton, Principal Medical Officer,
Research Development

Defence Research Board

Dr. M.G. Whillans, Assistant Chief Scientist
Dr. C.W. MacCharles, Executive Officer, Medical Section

Department of Veterans' Affairs

Dr. G.A. Winfield, Director of Medical Research,
Development and Planning

It has interviewed Dr. R.M. Taylor, Executive Director, National Cancer Institute of Canada, which derives part of its budget from funds provided by the provinces and by the Department of National Health and Welfare.

Members of the Committee have discussed the subject with the Deans of the Canadian medical faculties, and with others concerned with the administration and support of medical research by Government in Canada, the United States, the United Kingdom, Australia and Sweden, including Sir Harold Himsworth, Secretary, Medical Research Council of the United Kingdom, and Professor Bror Rexed, Secretary of the Swedish Medical Research Council.

The Committee has obtained a statement from each of the Deans of the Canadian medical schools, which describes the needs for research assistance in his university.

It has obtained, with the assistance of Doctors J. N. Crawford, B. D. B. Layton and C. W. MacCharles, figures which indicate the expenditures, in recent years, on extramural medical research by the various Departments of Government in Canada, and the comparable spendings in the United Kingdom, the United States and Sweden.

REPORT OF THE SPECIAL COMMITTEE APPOINTED TO REVIEW
SUPPORT OF MEDICAL RESEARCH BY THE GOVERNMENT OF CANADA

I. INTRODUCTION

1. The Aims and Achievements of Medical Research

"To gather knowledge, and to find out new knowledge is the noblest occupation of the physician. To apply that knowledge with understanding and with the sympathy born of understanding to the relief of human suffering is his loveliest occupation; and to do both with unassuming faithfulness sets the seal upon the whole."

Edwin Archibald

The dramatic discovery of insulin in 1921 focussed attention on Canadian medical research, stimulated the ambitions of young people to enter the field, and led the public to expect our scientists to make major contributions to medical science. This expectation has been justified. The full list of these can not be given now, but it would include: the isolation of hormones from the parathyroid gland, the pituitary body and the placenta; the introduction and use of anti-coagulants; the use of refrigeration in major surgery; the identification of the sex chromosome; the preparation of an artificial medium for the cultivation of mammalian cells; the discovery of the function of certain areas in the cerebral cortex; methods of surgical treatment of epilepsy; the discovery of the nature of certain diseases of the liver; knowledge of the variations in metabolism in health and disease; and a host of fundamental discoveries which fit into the general pattern of scientific knowledge. Gilbert Turner* has recently observed: "More curative drugs have been discovered in the past twenty-five years than in the whole previous history of medicine. Research during these years has given us antibiotics; has expanded many times our knowledge of the value and uses of blood transfusion; has made possible the daily occurrence of surgery of the heart and lung; has led to notable advances in the field of anaesthesia, making such delicate surgery possible; has given us new methods of treating those with mental illness; has given us the blood bank, the bone bank, the eye bank, the blood-vessel bank; has made it possible to save lives with the artificial kidney; has shown us how to save premature babies and how careful we should be of the eyes of these babies when we use oxygen; has given us the Cobalt 60 therapy unit; tells us of the effects of noise of the jet aircraft and of certain industries on the human ear; has given us a potent weapon against poliomyelitis; and is our tool in the fight against cancer."

These are the practical fruits of medical research; the obvious benefits to our citizens of the great investment of mind and money. But no one of these is the sole product of a single investigator, none could have evolved without the inspired contribution of clinicians at the bedside or in the operating room, and the painstaking work of scientists in the laboratories devoted to physics, chemistry, biology, anat-

* Turner, G. 64th Annual Report of the Royal Victoria Hospital for the year ending 31 December 1957.

omy, physiology, biochemistry, bacteriology, pathology, and pharmacology - mainly in the universities. The separate fragments of knowledge which they discover are fitted into the pattern of life, like items in a jig-saw puzzle, and finally there arise the diagnostic test, the therapeutic measure, the special skill of physician or surgeon, the saving of life and the prevention of disease.

To a great extent the investigators who have contributed to this vast ocean of discovery have been university teachers. The modern university accepts the responsibility of promoting research as well as of providing instruction to its students, and a university teacher expects to have facilities and opportunity for research. This arises from a conviction that teaching and research are mutually dependent and that each stimulates and enhances the other. Teaching is not restricted to the guidance of the undergraduate; a vital function is the training offered to graduate students. Future progress in medical research depends on the continuous flow of graduates into the research laboratories and clinics where they may develop the techniques, habits and intellectual characteristics of the productive scientist.

2. Importance of Medical Research to the Nation's Health

In the past fifty years the life expectancy of a child newly born in Canada has increased from fifty years to seventy years. The incidence of infectious diseases has been strikingly reduced, and specific measures of treatment have reduced their seriousness. Progress has been made in controlling the metabolic disturbances of middle age, and the crippling diseases of old age. These great benefits have been largely the fruits of medical research.

The quality of medical care in any country depends upon the stimulus provided by its medical schools, for in them are concentrated progressive, scholarly and stimulating leaders in the various fields of medicine. It is not enough that our teachers study and read widely, and keep abreast of sound practices based on discoveries made in Canada and throughout the world. If they are to inspire their students to practise medicine as a science, they must themselves be active in scientific discovery. If they are to teach that diagnosis must be based on critical examination of evidence presented, they must themselves demonstrate a critical approach to those explanations and opinions which are currently accepted as good teaching. Authoritative instruction proceeds from experience; the teacher who is active in a research field, who is continuously adding to knowledge by techniques which he can demonstrate to his students, excites and convinces them and is, in turn, stimulated by the penetrating questions they ask. It is by his example and enthusiasm that young men are persuaded to undertake the graduate training which leads to a career in research.

Unless the medical schools can provide those opportunities and facilities which allow gifted teachers free scope to plan and develop their ideas in medical research, they will fail to attract and hold talented young graduates, and medical teaching and medical practice in Canada will deteriorate. This is particularly important now since, in the United States, there is a shortage of medical scientists and attractive offers are being made to Canadians, at high salaries, to work in well-equipped laboratories supported with ample funds.

3. Development of Support for Medical Research in Canada

Although some support for research in special fields related to human illness was given by the National Research Council and the Department of Agriculture in the early thirties, it was not until 1938 that the National Research Council set up an Associate Committee on Medical Research, with a small budget and authority to provide grants-in-aid of research. Only a few investigators had been supported when war broke out, and this Associate Committee, through its subcommittees, embarked on a programme of vigorous prosecution of those investigations which might lend support to the Armed Services. The National Research Council later set up an Associate Committee on Medical Research for each of the Services. Each Associate Committee had a budget to meet its requirements; each called upon the universities to provide personnel and facilities to prosecute its investigations; each had continuous liaison with the research units of the Canadian Armed Services and with our Allies and other members of the Commonwealth; and by war's end the magnificent achievements of Canada in medical research were a proper source of pride to the Canadian Government, its Armed Services, and to the universities.

Fortunately, when the problems of war were no longer before us, the Government of Canada, recognizing the importance of research in the universities, made limited funds available for continued research in medical science. The National Research Council replaced the Associate Committees on Medical Research with a Division of Medical Research, whose principal term of reference was "to initiate, stimulate, and coordinate medical research in Canada".

A Defence Research Board was set up, with authority to spend money for medical research by a grant-in-aid system as well as by an intramural programme in its own installations.

The Department of Veterans' Affairs set aside a budget for the encouragement of research, mainly in its own hospitals.

In 1948 the Department of National Health and Welfare provided Health Grants to the provinces out of which money might be used for research, and established a Public Health Research Grant.

In 1948, at the request of the Division of Medical Research of the National Research Council, a survey of the research programmes and needs of the Canadian medical schools was carried out by a committee under the Chairmanship of Dr. C. B. Stewart, with representatives of the Defence Research Board and the Department of National Health and Welfare. This committee recommended increased support; there followed an enlargement of the fellowship programme of the National Research Council and a modest increase in the budget of its Medical Division.

In Canada, research in medicine is carried out in medical schools and associated hospitals, in special university departments such as the Connaught Medical Research Laboratories of the University of Toronto and the Institute of Microbiology and Hygiene of the University of Montreal, in the laboratories supported by the Government, and in such installations as the Health and Welfare Division of the

Dominion Bureau of Statistics. The programme directed by a Department of Government is related to the essential activities of that Department, and is more likely to be in applied than in basic research. But in the universities, the free imagination of the scientists leads them to experiment in the field of basic knowledge, and to investigate the nature of disease and the methods of prevention, treatment or repair.

The Canadian Government, in all of its provisions for the support of medical research, has recognized that the extramural investigations should be carried out largely in the university laboratories and hospitals. The expansion of the research programmes of the National Research Council, Defence Research Board, Department of Veterans' Affairs, and Department of National Health and Welfare after World War II gave the medical schools reassurance that the Federal Government would continue to support their research activities.

The first budget of the Associate Committee on Medical Research of the National Research Council was, in 1938, \$53,000. The initial budget of the Division of Medical Research, established in 1946, was \$200,000. From this modest beginning, Government support of medical research has increased progressively over the past twelve years. This development has been described in reviews by Ettinger* and Layton**. Its growth is shown in Table 1 and Figure 1. Government expenditures for medical research in 1957-58 amounted to \$5,550,000 (of which \$3,222,000, or 19.4 cents per capita, was available for extramural support). This was approximately 4.5% of the total Government expenditure on research.

Medical research in Canada is also supported indirectly from the general grants to the universities made by the provincial and Federal Governments.

The universities receive funds specifically for research from a variety of other sources, such as voluntary agencies (e.g. the National Cancer Institute, the provincial and National Heart Foundations, the Canadian Arthritis and Rheumatism Society), foundations created by provincial governments or through legacies (e.g. the Banting Research Foundation, the J.P. Bickell Foundation), business organizations (e.g. the Canadian Life Insurance Officers Association and pharmaceutical houses), and fraternal societies or clubs. Their total contributions in 1958-59 were approximately \$2,000,000.

During 1958 and 1959, there have been substantial and gratifying increases in the budget of the Medical Division of the National Research Council and in the funds which the Department of National Health and Welfare has allocated for research. This brought the total amount of Federal grants for extramural medical research for 1959 to \$4,959,000. Yet, despite these notable increases and the generous support of the voluntary granting agencies, the funds available for medical research in Canada are still far short of the advancing requirements.

* Ettinger, G. H. Medical Research, an Essay Prepared for the Royal Commission on National Development in the Arts, Letters and Sciences, 1949-51.

** Layton, B. D. B. Financing Medical Research in Canada: A Survey. Can. Med. Assoc. J. 76: 534, 1957.

4. Inadequacy of Support

Ten years ago, the support given by the Government of Canada to medical research in the universities was sufficient for a modest programme of grants-in-aid and medical research fellowships. In succeeding years the gradual increase in the provision of research funds, notably through the Department of National Health and Welfare and the National Research Council, has not kept pace with the changing pattern and increased needs of the medical schools for research support. This was largely due to five factors.

The first factor was a rather sudden expansion of scientific programmes in the universities. During the war years, all of the universities were short of staff, and many teachers approached the age of retirement. There was a shortage of experienced young men capable of accepting staff appointments for three or four of the post-war years, but as qualified teachers and investigators became available, older men were replaced and new appointments were made. Even this limited expansion in the medical schools created a demand for research support which was not met adequately by the granting bodies.

The second factor was the establishment of two new medical schools (the University of Ottawa and the University of British Columbia), and the expansion of a third (the University of Saskatchewan) into full four year course. Thus, three new groups of medical scientists were added to those in the older schools, increasing the opportunities and need for research support.

A third factor is the development of new, precise and very expensive research tools. It would have been a brave prophet who, ten years ago, could have predicted that to-day the cardiac physiologist would require several electronic recorders costing from five thousand to twelve thousand dollars, or that the pathologist would require an electron microscope costing thirty thousand dollars instead of an ordinary binocular microscope which might cost five hundred. However, the need and use of such modern electronic instruments is not the only factor that has made research more costly; with inflation, every piece of equipment has risen in price, salaries of technicians have advanced sharply, and even the cost of animals and ordinary supplies has increased three-fold.

The fourth factor is inadequacy of research space. The buildings originally erected for the use of the older medical schools were designed for teaching, with little provision for research. Many of these are still in use; research is conducted in meagre quarters, in laboratories designed for teaching, or even in corridors. New buildings or extensions to older buildings have been erected in some schools in the past decade, and buildings combining teaching and research are planned; but university resources have not been adequate to provide all the laboratories necessary for research, since facilities for teaching must be expanded as

well. The Deans estimate that a medical school should provide at least as much space for research as is available for teaching. The cost of building, furnishing and equipping laboratories for research greatly exceeds that for teaching; for example, in one school the laboratory furniture installed for research cost two and one-half times that installed in the teaching laboratories and classrooms. In a number of provinces, considerable support for equipping research laboratories has been provided from the General Public Health Grant*, but the Departments of Health in other provinces have been unable to relinquish money for this purpose. Where provided, such assistance has been very helpful, but it is not enough, for the cost of the building greatly exceeds the cost of equipment. All medical schools have insufficient research space, and there is little hope of providing this from university funds.

The fifth and perhaps the most important factor is the great expansion of research in the medical sciences which has occurred over the past two decades. As in other fields of research, notably the field of atomic energy, each new discovery opens up new vistas, opportunities and obligations for research. New methods of treatment require careful clinical evaluation as to their potential danger and efficacy. They also frequently provide new methods for studying the disease state. The discovery of insulin led to innumerable researches, and required careful study of diabetes, and of the late complications that come in spite of insulin administration. Accidental death due to over-administration of a sulphonamide led to the discovery of substitutes for insulin; years of experimentation were necessary before these could be given with safety to man. These investigations revealed much information concerning the metabolism of carbohydrate and the cause of diabetes. The discovery of a successful treatment of pernicious anaemia stimulated much research on the fundamental mechanism of blood formation and the treatment of other types of anaemia. The use of antibiotics in the treatment of infection has saved countless lives, but has also introduced new problems of sensitivity and resistance which have required investigation. The millions of dollars spent on research on the synthesis of cortisone and related steroids has led to much more effective treatment of many diseases; this in turn has made new demands for research. In the important area of mental health, new understanding of disorders of the mind, and of their intimate relation with bodily function, has led to greatly improved treatment of patients, and has revealed many new problems which require investigation.

The past few years have seen a growing realization of the importance of research of all kinds by the Western countries. Expenditure for medical research, particularly in the United States, has increased far more rapidly than has the gross national product. In Canada the universities have always made the major contribution to the cost of research, through provision of scientific staff, laboratories, and libraries. Yet now - when research should be expanded - our universities are faced with the problem of increased student enrolment, and of mounting teaching costs which will strain their resources.

* Department of National Health and Welfare Health Grant.

5. Government Support of Medical Research in Other Countries

A symposium on The Support of Medical Research, organized by the Council for International Organizations of Medical Sciences, was held in London, 4-8 October 1954 under the Chairmanship of Sir Harold Himsworth, Secretary of the Medical Research Council of the United Kingdom. The conference was attended by representatives of seventeen countries. The published report* of this conference contains reports on the programmes for support of medical research in most of these countries, and records the proceedings and recommendations of the conference. This report provides much useful information, especially that related to Great Britain which, despite its austerity programme, has given substantial support to medical research through the Medical Research Council and the University Grants Committee; to Sweden, which is similar to Canada in standard of living and medical care; and to the United States which exerts a great influence on Canadian medical research and medical education.

a) Great Britain**

The promotion of medical research in the United Kingdom has been a Government responsibility for nearly 45 years. In the original National Health Insurance scheme introduced in 1911, provision was made for a sum of money to be set aside as a Medical Research Fund, and a special Medical Research Committee was appointed. The Committee made important contributions to the national effort in the First World War. It was replaced in 1920 by the Medical Research Council, established "to direct the continued performance of the duties heretofore performed by the Medical Research Committee".

The Medical Research Council makes grants for research support to individual scientists in universities, awards fellowships, and employs scientific and technical staff in its research units, which are usually associated with medical schools, and in the National Institute for Medical Research at Mill Hill.

The appropriation for the Medical Research Council has increased more than six-fold since 1946 to a figure of £ 2,813,000 (approximately \$8,000,000) in 1957-58. It is estimated that an additional £ 2,700,000*** of the University Grants Committee's allocation to medical and dental schools is devoted to research. The budget for the Medical Research Council for the period 1948-58 is shown in terms of the gross domestic product in Table 2(B).

* Himsworth, H. and Delafresnaye, J.F. The Support of Medical Research. A Symposium. C.C. Thomas, London, 1956.

** Green, F.H.K. The Constitution and Functions of the United Kingdom Medical Research Council. Science, 116: 99-105, 1952.

*** Personal communication to the Committee from W.D. Patt, Medical Research Council of Great Britain.

b) Sweden

Sweden, with a population just over one-third of that of Canada, is very similar in economic and educational standards and in scientific development. Government expenditure in all research fields in 1957-58 was approximately 1.64% of the total Government budget, or 0.4% of the gross national product. Of this, approximately 14% was allocated for medical research. This amounted to 24,353,000 Sw. kr., or approximately \$5,000,000. A recent report* predicts that by 1963, 2.78% of the Government budget will be devoted to research, with medical research support increasing in proportion.

Grants made to the universities by the Government of Sweden include provision for grants-in-aid, fellowships, salaries of research scientists and the construction of research laboratories. This constitutes the major support for medical research. As the result of the report** of a committee appointed to study the organization of medical research support in Sweden, a Swedish Medical Research Council was established in 1945. The Council is the chief adviser to the Government in matters dealing with medical research, and cooperates with the Board of Defence Medicine and the other research councils. The budget of the Swedish Medical Research Council from 1948 to 1958 is given in Table 2(C) and Figure 2.

The Medical Research Council has recommended that research be supported chiefly in the universities, medical schools, hospitals and affiliated institutions. It does not plan any central research institute. Only 10 - 15% of the funds provided by the Government for support of medical research is channelled through the Council, but this plays an important part in providing additional support where needed, and in developing new research.

c) United States of America

In the United States, there has been a tremendous increase in the funds available for medical research since 1940. This has been chiefly due to increased Government support, which grew from \$3,000,000 in 1940 to \$186,000,000 in 1957*** and to \$294,000,000 in 1959. Although the National Science Foundation provides some research funds for the medical schools (approximately \$1,000,000) and the Department of Defence and the Atomic Energy Commission also provide some assistance through contracts with the medical schools, by far the most

*Forskningsens Villkor Och Behov. 1955 Ars Universitetsutredning, Statens Utredningar 1958: 32, Stockholm, 1958.

**Betankande Borande Organisatoriska Atgarder for Den Medicinska Forskningsens Framjande. Statens Utredningar 1944: 55, Stockholm, 1944.

***The Advancement of Medical Research and Education Through the Department of Health, Education and Welfare. Final Report of the Secretary's Consultants on Medical Research and Education, Washington, June 27, 1958. p.26.

important agency has been the Department of Health, Education and Welfare, through the National Institutes of Health. In addition to the intramural programme in their laboratories in Bethesda, Maryland, and in other Department laboratories, they support a vast extramural programme of research in the universities. The growth of the extramural research programme (project grants and fellowships) during the period 1948-59 is shown in Table 2(A) and Figure 3. It should be noted that in 1959 the budget for this programme was increased by more than \$57,000,000, and that almost as large an increase is forecast in the estimates for 1960*.

The extramural programme of the National Institutes of Health is very liberal. Applications are reviewed by 28 Study Sections composed of scientific experts in each field, which act as technical review groups. They make recommendations to one of the ten Advisory Councils of the National Institutes which must approve the application before a grant is made. As a result of critical examination of the programme, the trend is now to the award of substantial grants (\$20,000 - \$75,000) on a term basis (5 years) to established investigators. An allowance of 15% of the direct cost of the research is made to cover indirect charges or overhead. The N.I.H. also award training grants to medical schools to provide additional staff and equipment for increased training in special areas.

The consultants on medical research and education in their report to the Secretary of the Department of Health, Education and Welfare, estimated that the Government's expenditure for extramural medical research should rise from \$1.09 per capita in 1957 to over \$2.00 per capita in 1970, at which time the total budget for medical research in the United States should approach 1 billion dollars per year.

Recently, funds have been authorized under the Health Research Facilities Act of 1956 (Public Law 835, 84th Congress) for a three-year construction programme of non-Federal medical research facilities. Thirty million dollars are made available annually on a matching basis for this purpose in medical schools and hospitals.

d) Comparison of Support in Canada with That in Other Countries

Despite differences in the organization of medical research in the four countries, some useful comparisons are possible. In Figure 2, the expenditures of the Division of Medical Research of the National Research Council are compared with those of the Medical Research Councils of Sweden and the United Kingdom. The support of the latter is largely confined to its own units in the medical schools and the National Institute of Medical Research, but the type of research is in many respects similar to that supported by the National Research Council in Canada. It

* Personal communication to the Committee from Dr. E.M. Allen, Chief, Division of Research Grants, National Institutes of Health, Bethesda, Md.

does, however, support some projects which are supported in Canada by the Department of National Health and Welfare. The extramural programme of the National Institutes of Health in the United States covers areas supported in Canada by both the Medical Division of the National Research Council and the Department of National Health and Welfare. In Figure 3, the combined expenditures of the latter are compared with the awards by the National Institutes of Health for project grants and fellowships only (excluding training and construction grants). Expenditures are expressed in terms of the gross national product of each country, since it is felt that this provides the best basis for comparison. In comparing these expenditures, it should be remembered that those of the Medical Research Councils of the United Kingdom and of Sweden represent about 50% and 15%, respectively, of the Government's contribution to medical research. On the other hand, the figures for Canada make no allowance for that portion of the general funds supplied to the universities by provincial governments and by the Federal Government which is used for the indirect support of medical research. While these considerations limit the value of the comparisons, it is nevertheless clear that Canada now lags far behind the United States in its support of medical research, and does not appear to have caught up with the United Kingdom and Sweden, despite the recent increases in budget.

II. PROCEDURES IN THE ADMINISTRATION OF FEDERAL FUNDS FOR MEDICAL RESEARCH

1. National Research Council

The medical research programme of the National Research Council was undertaken in 1938 as a result of representations made by the Canadian Medical Association and the Royal College of Physicians and Surgeons of Canada, supported with particular urgency by a group of men interested in medical science, led by Sir Frederick Banting. The first Associate Committee on Medical Research included men distinguished for their position in the medical scientific world - Sir Frederick as Chairman, Professors J. B. Collip, Duncan Graham, Velyien Henderson and Wilder Penfield. These far-sighted men proposed that liberal grants be offered for the stimulation of research in the Canadian medical schools, and that fellowships be made available for training young medical graduates in research. They also recommended that suitably trained scientists be established in research positions in the universities. There was considerable interest in the establishment of a Medical Research Council which, with Federal funds, would stimulate, support and coordinate the research activities in the medical schools; it was agreed that this organization should evolve out of the Associate Committee of the National Research Council.

But budget and the time were not propitious for the early plans of the Associate Committee. The first budget of \$53,000 was insufficient for supporting fellowships in addition to modest grants-in-aid. The threat of war soon matured into conflict, and Canadian research funds were now applied to the solution of the problems of war. It was not until 1946 that serious attention could be paid to the aims of the first Associate Committee. Again the medical advisers of the National Research Council recommended that no central research laboratories be erected and again they were persuaded that their hope of the establishment of a Medical Research Council was premature.

But in the interim, a Division of Medical Research was created, with Professor J.B. Collip as first Director, and a Medical Advisory Committee was appointed to advise him on the development of policy and the making of awards out of the initial budget of \$200,000. Fortunately this sum was adequate to support a fellowship programme; and slowly increasing budgets in subsequent years combined with very wise advice from succeeding Advisory Committees, helped the Division of Medical Research build a reputation for fairness, integrity and wisdom in the distribution of its funds.

A public enthusiasm for research in the field of specific diseases led, in the meantime, to the creation of voluntary agencies which solicited funds for research in these special areas. These special agencies sought the advice of the National Research Council in their plans for development and, as their budgets became large enough to take care of research applications, the Council reduced its own support in these special fields. The research programme of the Department of National Health expanded rapidly, and included provision for investigations in the cardio-

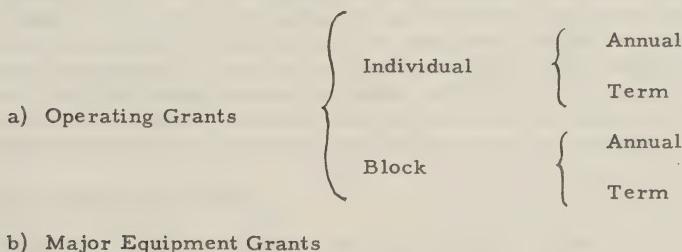
vascular field and in mental health. Thus, gradually, the Division of Medical Research became recognized as supporting basic medical research, while applications clearly in the field of cancer, public health, arthritis, mental health, and (in certain provinces) cardiovascular disease, were directed to other appropriate agencies.

The Advisory Committee meets at least twice a year to review and make recommendations concerning applications for research grants and fellowships, to examine reports of grantees, and to advise the Director on such other business as he may lay before it. All applications for research grants are given a critical appraisal by members of the Committee and by additional referees to whom they are sent; thus grants are made only when, in the opinion of competent judges, the investigations deserve support. Research is supported in three ways - by the provision of grants-in-aid, of fellowships for training in research, and of research associateships for the establishment of trained investigators on the staffs of the medical schools.

Grants - in - Aid

The Medical Division of the National Research Council provides operating grants and major equipment grants to qualified investigators. By offering free choice of problems it promotes investigations in the broad field of medical research - limited only by its budget.

A grant-in-aid may be used for the purchase of animals, food or care of animals, expendable supplies, professional or technical help, and research equipment. Basic types of grant, as evolved from the original programme of annual grants, are as follows:-



b) Major Equipment Grants

a) Operating Grants

Individual Grant An individual grant is made to one person, who is solely responsible for its use in his own research.

Block Grant A block grant is essentially an arrangement by which grants to several individuals can be fused. Such a grant is made in the name of the senior member of the group, usually a departmental head, and is designed to facilitate the collaboration of investigators. This device supplies a method for integrating the financial support of a group of

investigators who customarily work in an integrated fashion. In this it is to be contrasted to the individual grant which supports the work of a single investigator.

Annual Grant An annual grant covers the period of one year. It is particularly suitable for the assistance of a research worker in the early years of his career and of an established investigator in the initial exploratory phase of a new study.

Term Grant A term grant differs from an annual grant in that the period covered is two to five years. It is designed to assist investigators of proven competence.

It is unusual that a research problem in medicine can be solved in one year, and requests for renewal of annual grants are ordinarily expected. An established investigator, or a group working in a department or institution, may request a term grant. This provides continuing support for a definite period of years in specified minimal annual instalments which are paid automatically. Since an annual application is not required during this period, both individual and block term grants reduce administrative labour in the offices of the Council and provide security of support to grantees.

Consolidated Grant Ten years before block term grants were made available as described, the Division of Medical Research awarded a number of consolidated grants. These were awarded for the maintenance of research in a university department or institution in which, under an experienced director, the programme was stable, and recognized to be of high merit. No investigator in the department or institution was permitted to make a separate application to the Division. The grant was to be of a fixed amount annually, and not subject to reduction should the resources of the Division be reduced. Conversely, the consolidated grant could be increased only after careful consideration had been given to other applications for support; this tended to be an embarrassment in the face of rising costs. Nine consolidated grants are still in effect, but no new ones are planned.

b) Major Equipment Grants

Modern research requires the use of tools which are very expensive and rarely available through the ordinary budget of a university. The Council has instituted major equipment grants to provide instruments or special research equipment in units which cost \$3,000 or more. The purchase of less expensive equipment is possible through ordinary operating grants.

All grants-in-aid of research described above are made outright to the grantee. The unspent balance of a grant does not lapse at the close of the fiscal year of the Government, but remains to the credit of the grantee for the continuation of the research for which it was made, or for an alternative purpose for which Council approval may be obtained. This is a great boon to the grantee, for, not infrequently, equipment which is ordered within the year of the award is not immediately available, and legitimate expenses incurred within the fiscal year can be easily met if accounts are rendered beyond it.

Fellowships

Research fellowships for training in medical sciences have been awarded since 1946. For qualification the candidate must have the M.D. or the Ph.D. in a science related to medicine. A majority of candidates are graduates of Canadian medical schools. The initial stipend depends upon graduate experience. A candidate fresh from medical school may be paid \$2,300; for each year of internship or other hospital training subsequent to graduation he may expect to have his initial stipend increased by \$200 or \$300. A fellowship is renewable after a satisfactory year's work; to encourage a lengthening of research training the stipend for the renewal is increased by \$800, and for a second renewal by an additional \$500. The maximum stipend available is \$4,500 per annum, and no-one may hold a fellowship for more than four years.

Normally the fellow is expected to hold his fellowship in Canada, but a second or later tenure may be held abroad if the training desired is not available in Canada.

Since 1946, 384 fellowship awards have been held by 249 persons. A majority of those who have been trained under this programme are now associated with Canadian medical schools, teaching or doing research, or both. Some hold professorships and are active and productive scientists.

Medical Research Associateships

In 1955 the National Research Council recognized the desirability of establishing secure appointments for senior medical scientists in the universities, in positions equivalent to those available in physics, chemistry, biology, etc. in its central laboratories. Accordingly the post of Medical Research Associate was created. A limited number of these are available, with initial tenure of two years, and subsequent re-appointment possible at five-year periods. The university must apply for the appointment of a named person, who must be offered a university appointment; the National Research Council pays the salary to the university, which acts as the employer. The appointee is permitted to do only a limited amount of undergraduate teaching, for he is expected to devote most of his time to research. Great care has been exercised in the selection of the sixteen Associates already appointed.

In the fiscal year 1958-59, the expenditures of the Division of Medical Research were as follows:-

Annual Grants	\$ 458,481
Term Grants	639,460
Equipment Grants	223,438
Fellowships (30)	91,391
Research Associateships (12)	109,981
	<u>\$ 1,522,751</u>

9,000 p.m.

2. Department of National Health and Welfare

In May, 1948, the Prime Minister announced, in the House of Commons, the policy of the Government with respect to health services and health insurance. It proposed to make available Health Survey and Hospital Construction Grants, and, in addition, health grants in the following categories: (1) General Public Health, (2) Tuberculosis Control, (3) Mental Health Care, (4) Venereal Disease Control, (5) Crippled Children's Grant, (6) Professional Training, (7) Control of Cancer. These health grants, and those which were subsequently added, viz. Child and Maternal Health, and Medical Rehabilitation, were offered to the provinces in amounts based upon population. They were primarily intended to assist in the promotion of health services, but might be used in part to encourage research in the particular fields. A provincial Minister must recommend the award of a research grant from a health grant, but the final authority for the award rests with the Department of National Health and Welfare.

The Prime Minister also announced that research in the public health field would be supported directly by a Public Health Research fund administered by the Department of National Health. In the first year this was to amount to \$100,000; it was to increase annually by \$100,000 until \$500,000 was reached. It is a common pool out of which a research award may be made to any capable investigator in any province upon the recommendation of the Ministry of Health in that province, subject, of course, to the approval of the Minister of National Health.

Thus the extramural grants-in-aid research programme of the Department of National Health and Welfare is an integral part of assistance to the provinces. It is, in general, applied research directed in the main towards the early application of the results obtained, rather than primarily to increase total knowledge of a subject.

In keeping with the above general policy, individual research projects are directed towards the improvement of public health administration and the advancement of the means of prevention and control of disease. In pursuit of these objectives, projects may also have to do with diagnosis, treatment and rehabilitation of acutely or chronically ill patients. These studies may be conducted in the field, in public health and university laboratories and hospitals, and may include the development of new agents and procedures. The specific spheres of interest of the Department of National Health and Welfare include the following:-

- a) Health Grants - Preventive Medicine: administration, bacteriology, epidemiology, environmental sanitation including radiation protection; mental health, tuberculosis, heart and arterial disease, arthritis and rheumatism, maternal and child health. Modification in this programme may be required from time to time consistent with changes in Health Grants policy.
- b) Hospital Insurance and Diagnostic Services - hospital administration in general, services provided under hospital insurance plans for both in-patients and outpatients including the prevention and control of chronic illness, and laboratory, radiological and other diagnostic procedures as related to Federal-Provincial programmes.

- c) Other Health Problems of Major Significance - this would include projects in applied research as related to the prevention and control of other acute and chronic illnesses which are of major public health significance.

Depending upon the expressed wishes of the provinces and the availability of funds, situations may arise not entirely in accord with the generalities of these principles, but otherwise they apply to the research programme as a whole.

The Department of National Health and Welfare relies exclusively on the annual grant form of support. Despite the limitations of this type of support, universities and hospitals which have enjoyed it have succeeded in establishing important and permanent research centres where none existed before.

In the administration of the Public Health Research Grants, the Dominion Council of Health, consisting of the provincial Deputy Ministers with the Deputy Minister of National Health as Chairman, acts in an advisory capacity regarding administrative and scientific policies on medical research. An application for support is submitted by the university or research institution on behalf of the applicant through the provincial Department of Health. It is reviewed by the provincial Deputy Minister, who may consult an advisory committee. If approved, it is then forwarded to the Health Grants Administration of the Federal Department. There it is appraised by departmental consultants, and the opinions of outside consultants or referees are sought. All applications for public health research grants are then reviewed by the Research Advisory Committee which makes recommendations to the Dominion Council of Health and to the Deputy Minister.

Applications for the support of research from the Dominion-Provincial Health Grants are processed in much the same way. Research subcommittees of the advisory committees to the Minister of Health are available in the field of mental health, and child and maternal health, and these are consulted in connection with applications. In the case of applications submitted under other health grants, the provincial authority sponsors the submission and appraisal is carried out by both intra- and extramural consultants upon whose recommendation approval may be granted by the Minister. Final approval in all cases rests with the Minister of National Health and Welfare on the recommendation of the Deputy Minister.

A province is entitled to use a portion of the Cancer Control Grant for research, and certain provinces hand monies from that grant together with their own funds to the National Cancer Institute to be used in its research programme. The Ontario Heart Foundation and the Canadian Arthritis and Rheumatism Society give the Department of National Health and Welfare advice on applications which it has received for grants in their respective fields.

The research grants of the Department of National Health and Welfare make a valuable contribution to extramural medical research in Canada. Because funds from the Medical Division of the National Research Council have been limited in the past years, a number of projects not directly related to public health problems have also been supported by the Department.

The financial growth of the research programme of the Department of National Health and Welfare is shown in Table 1 and Figure 1. Funds lapse at the end of the fiscal year and there is no carry-over. During the fiscal year 1958-59, expenditures amounted to \$2,000,000; this comprised awards made under the Public Health Research Grant and under the Dominion-Provincial Health Grants, including funds allocated to the National Cancer Institute and to the Ontario Cancer Treatment and Research Foundation.

3. Department of National Defence - Defence Research Board, Medical Section

The Defence Research Board supports medical research of immediate or potential defence interest, in the universities, through its extramural grant-in-aid programme. While the work may be basic in character it must aid the defence effort either through the actual research undertaken or by the type of post-graduate training given. Grants are made on an outright basis; there is considerable flexibility in their use and they do not revert at the end of the year. Although the grants are made on an annual basis, some continuity is assured the grantee, and in practice support is not terminated without at least one year's notice.

The Board has also established four special research units: an Arctic Medical Research Unit at the University of Manitoba; a Radiobiology Unit at the University of Toronto; an Aviation Medical Research Unit at McGill University; and a Psychiatric Research Unit in Ottawa. These were set up to meet specific needs in these areas of defence interest. The Board pays the salaries of the responsible investigators (who are given suitable academic appointments) and provides funds for the operation of the units.

In recognition of the shortage in Canada of young physicians with experience in radiation biology and aviation medicine, the Board offers fellowships and medical research associateships to provide for training and careers in these fields.

Each application for a grant-in-aid is examined by a panel of scientific experts, drawn from the Canadian universities and other institutions. There are at present fourteen such panels: Antibiotics, Arctic Medical Research, Auditory Problems, Aviation Medicine, Blood Transfusion and Preservation, Coagulants and Anticoagulants, Infection and Immunity, Burns and Wounds, Nutrition, Psychiatric Research, Radiation Protection and Treatment, Shock and Plasma Expanders, Toxicology, and Visual Problems. Panel recommendations are transmitted to the Grants Committee of the Defence Research Board. The following two Committees advise the Defence Research Board on policy and coordination of defence medical research:-

The Defence Medical Research Advisory Committee is made up of (1) the members of the Coordinating Committee, (2) a scientific representative of each of the Departments with membership in the Coordinating Committee, (3) the Chairmen of all Defence Research Board Medical Panels, (4) the Chairman of the R.C.N. Personnel Research Committee, (5) the Chief Superintendent of the Defence Research Medical Laboratories, and (6) a maximum of three members at large. It functions as an advisory committee to the Defence Medical Research Coordinating Committee and to the Defence Research Board.

The Defence Medical Research Coordinating Committee is an interdepartmental coordinating committee whose members, in addition to the Chairman and Executive Secretary, are the Chairman of the Defence Research Board, the senior Medical Representatives of the Department of National Health and Welfare, the Department of Veterans' Affairs, the National Research Council, the Navy, Army and Air Force and the Defence Research Board, the Chairman of the Canadian Forces Medical Council and the Surgeon General Canadian Armed Services.

The development of extramural financial support for medical research by the Defence Research Board is shown in Table 1. During the fiscal year 1958-59, expenditures amounted to \$408,547.

4. Department of Veterans' Affairs

In 1950, the Department of Veterans' Affairs organized a programme of clinical research in its hospitals across Canada. The original budget of \$300,000 was provided mainly for the assessment of types of clinical treatment and for long-term follow-up studies. Initially, a good deal of the research budget was devoted to the evaluation of ACTH and cortisone. Subsequently, the programme has been extended to many fields of clinical research. One might regard this programme as intramural since the money is spent in D.V.A. hospitals. However, the funds are allocated on a grant-in-aid basis and, with few exceptions, the work is actually directed by members of medical faculties who hold D.V.A. appointments. It is essentially similar to the extramural programme of other Government agencies. To formulate policy and advise on research projects, there is an Advisory Board on Medical Research and Education. The Chairman is a senior medical officer in the Department, and the Board has a membership of eight prominent medical experts.

A research grant application is reviewed by a clinical research committee in the individual D.V.A. hospitals and is then transmitted to the Director of Research. The application is considered by the Advisory Board on Medical Research and Education which may utilize the services of special consultants. The Board meets twice a year and, between meetings, research projects may be approved by correspondence. On approval, funds are released to the hospital concerned as a drawing account to cover salaries and the cost of conducting the research.

A grantee who desires continuing support is required to submit a progress report annually with the re-submission of the application, and at the conclusion of the project, a final report. No financial statement is required of the grantee since this is dealt with by the financial officers in the Department and the hospital. All funds lapse at the end of the fiscal year.

This programme provides valuable opportunities for clinical research particularly in chronic diseases, and contributes to the quality of treatment in the D.V.A. hospitals. Of the budget of \$324,000 for 1958-59, \$17,421 was expended on three small extramural research grants, and the balance used for the intramural programme outlined above.

5. Critical Appraisal of Procedures

a) Annual versus Term Grants

Every investigator who depends for support on an annual grant is faced with doubt as to whether his research programme will be continued, and the professional and technical assistants employed under such grants are faced with the possibility of being out of a job on 1 April. A system restricted to annual grants discourages the planning of long-term research programmes, increases the volume of administrative work for the research agency, and the time lost from research by the scientist in preparing reports and applications. The greater use of term grants by all Government agencies is strongly recommended.

b) Method of Awarding Grants

The methods of awarding grants which have been adopted by the various agencies are not very dissimilar. All require applications to be submitted in the autumn, usually before 1 December. Applications for the renewal of grants are accompanied by reports of the previous work. An application contains a review of the current knowledge relevant to the project, an outline of the proposed work and an itemized estimate of the funds required under headings such as professional and technical assistance, expendable supplies and equipment. The applications are assessed by various authorities who make recommendations concerning the scientific merit of the proposals and the validity of the financial requests. Each agency collates the applications it has received and reviews them in relation to the funds it has at its disposal. Applications which are not recommended by referees are rejected or given a low priority. Progressive reductions in the amounts to be awarded to various applicants are then made until the total amount of the grant programme is brought into line with the funds available to the agency. This process requires consideration in each case of such factors as the amount of funds otherwise available to the applicant, the value of the project, the essentiality of the items requested and the import of the grant to the future research career of the applicant. When the final decisions are made, usually late in March, the applicants are notified of the amounts awarded for the financial year commencing 1 April. This general description of the method of handling applications applies to all agencies. In recent years, more than 500 applications have been processed in this way, which, having regard for the detailed consideration required by each application, is an effort for which the agencies deserve congratulation. Extensive use of term grants by the Departments of Government would reduce this effort and would permit a more careful scrutiny of the applications to be considered.

It is not uncommon for a candidate to apply for a grant for the same project to more than one granting body, justifying the duplication by a slight variation in title or emphasis. Granting agencies have all applications examined by volunteer referees, and it is not unusual for a referee to be asked for an opinion on the same application from two or more agencies! Knowing that he cannot get all the money he requires for his researches from one agency, an applicant may break his application up into a series of sub-problems and submit one of each to a different agency; this leads to multiple refereeing and unnecessary administrative activity.

The general method for handling applications for annual grants is satisfactory, provided that the number of such applications is reduced to a point which will allow the agencies to reach decisions and notify the applicants at least one month prior to the commencement of the next fiscal period. An experienced investigator should obtain his needs from one principal agency so that he need not waste time in multiple solicitation with consequent repetitive reporting and accounting.

The situation in the Department of National Health and Welfare is complicated by the fact that it operates under regulations governing the provision of grants to assist the provinces in extending and developing health services. The Department has thus been less free than its sister agencies to introduce new administrative procedures. The inter-position of the provincial Health Departments increases the steps involved in processing applications, with consequent delay.

The time has now arrived when new working arrangements for this research programme should be discussed with the provinces. In view of the important part played by the Department of National Health and Welfare in the development of extramural medical research in this country, and the probability that the importance of this participation will increase, it is vital that these organizational difficulties be solved. It is no less important that the present system of grant administration, which is based exclusively upon the making of annual grants, be re-organized, and that the research administrative procedures of the Department be brought into line with those used by other granting bodies in this country, viz. assurance of continuity of grants, flexibility in use of funds awarded, and simplification of administrative procedures.

c) Method of Administration of Funds

The National Research Council transfers funds in advance to the institution to which the grantee is attached. The grantee then issues requisitions against these funds and the accounts are maintained by the institution for inspection by the accountants of the Council. At the end of the fiscal year the institution reports the amount unspent in each grant. This is retained to the credit of the grantee if his project is continued, otherwise it is returned to Council. Under this system the grantee is expected to spend the money in a way generally corresponding to the description in his application.

The Defence Research Board has always made outright grants, establishing a trust fund from which money may be advanced to the university on behalf of the grantee on request. Recently, the procedure has been adopted of considering any balance unexpended at the end of the fiscal year as part of the new grant (if one is awarded), and the new appropriation is correspondingly reduced. This prevents accumulation of funds in these accounts. Personnel employed under the grant must be approved by the Defence Research Board and quarterly statements of expenditures (under general categories) are required from the university accountant. While term grants are not made, it is customary to give at least one year's notice before terminating a grant.

The grants of the Department of National Health and Welfare are administered as though the funds were of provincial origin. The Federal Department reimburses the province for authorized expenses incurred and in many instances the province carries this policy to the grantee. Authorized expenditures are those detailed in the application and approved at the provincial and Federal Government levels. This system of rigid control is self-defeating in that not only are the accounting costs high, but it leads to inefficient use of the funds. The applicant is required to specify in detail his annual requirements six months before the beginning of the fiscal year. It is not reasonable to expect him to be able to specify so far in advance the exact type of equipment which will best suit the purposes of an experiment which at the time of application may be only roughly formulated.

In commenting on the fiscal procedures of the granting agencies, it is fair to say that the National Research Council and the Defence Research Board have, by a series of steps over the years, reached a very satisfactory method of handling their funds. In the case of the research grants programme of the Department of National Health and Welfare, due to its peculiar relationship to the provinces, it has not been possible to modify substantially the system introduced over ten years ago. This question should have the immediate attention of the medical research advisory committee of the Department, whose appointment is proposed in the next section. It is suggested that the Federal Department should administer the funds and that it explore with the provinces methods whereby the types of administrative procedure used by the National Research Council might be applied to Public Health Grants.

6. Deficiencies in Current Grants Programme

In the preceding paragraphs critical attention has been directed to certain details of the administration of the present grants programme. A serious defect lies in the restricted nature of the grants. Operational grants make no provision for unforeseen requirements which become apparent during the year. These might be met by an uncommitted or fluid research grant made to the Dean of each medical school on a term basis.

A much greater need is the provision of funds for the erection of buildings. A new mechanism by which the Government can supply such funds is required.

III. PROPOSALS CONCERNING POLICY AND COORDINATION

1. Establishment of a Medical Research Council

Support of medical research was not mentioned in the original terms of reference of the National Research Council when it was set up in 1916. However, under the urgings of leaders in medicine, including Sir Frederick Banting, Dr. J.B. Collip and Dr. Wilder Penfield, the Council set up an Associate Committee on Medical Research in 1938 and later established a separate Division of Medical Research in 1946. It was expected that a Medical Research Council would evolve out of this programme. With the sympathetic support of its succeeding Presidents, the National Research Council has given increasing funds and independence to the Medical Division, until it is now practically autonomous. The time has now come to take the final step and establish an independent Medical Research Council. This opinion is shared by virtually all medical research workers in Canada, and those consulted in other countries.

There has been a marked increase in medical research in the past two years, and this expansion will accelerate in the future as knowledge grows. Great acceleration has already occurred in the United States, where extramural Government support of medical research has increased by more than \$57,000,000 in the past twelve months. This growth should be directed in Canada by a council of eminent medical scientists who are familiar with the complex problems involved. This council should advise the Government on the policy and programme of support of medical research. It should have the same independence and flexibility in the use of funds as has the National Research Council, and should report to the Committee on Scientific and Industrial Research of the Privy Council, rather than to a Department of Government*.

There are advantages in placing responsibility directly on the Medical Research Council. As the senior body of medical scientists, it could provide leadership and cooperate closely with the other Government Departments and agencies supporting medical research. It would also command the respect and support of such bodies as the Canadian Medical Association, the Royal College of Physicians and Surgeons, the Canadian Federation of Biological Societies and the Association of Canadian Medical Colleges.

It would always be important to maintain good liaison with the National Research Council and have available its advice. There would also be many practical advantages in sharing its administrative facilities, particularly in the early stages.

* Some of the cogent reasons for reporting to a Committee of the Privy Council rather than to a specific department are set forth in a historic memorandum presented to the Parliament of Great Britain in 1919 by Christopher Addison. These reasons, as summarized by F.H.K. Green, are given in Appendix B.

The Committee therefore recommends:-

- a) That a Medical Research Council be now established under terms similar to those of the National Research Council;
- b) That the Medical Research Council report directly to the Privy Council Committee on Scientific and Industrial Research, through its Chairman;
- c) That the Medical Research Council consist of a President, Secretary, and not more than 16 other members, chosen on the basis of their interest and experience in medical research;
- d) That the Medical Research Council advise the Privy Council Committee on policy and matters relating to medical research;
- e) That the Medical Research Council administer the funds allocated to it, and support and encourage the development of medical research in Canada;
- f) That the Medical Research Council assume among its responsibilities those now assigned to the Division of Medical Research of the National Research Council.

2. Advisory Committees on Medical Research in Departments of Government

A Department of Government which provides funds for extramural medical research should have the advice of a committee of scientists for determining the value of the researches proposed in applications, and the extent to which they should be supported, and for making recommendations concerning policy, including that related to grants administration. Such assistance can best be provided by the appointment of a research advisory committee; where the Department makes grants in several medical specialties, the research advisory committee might have the appropriate subcommittees or panels. To provide continuity, members should be appointed for at least three years. This committee should meet at regular intervals throughout the year. It should advise the minister on all matters of policy and, in particular, should discuss with him major policy changes which concern his research programme.

The Committee recommends that for each Government Department which grants funds for medical research, there be an advisory committee of scientists who have experience in medical research.

3. Interdepartmental Medical Research Coordinating Committee

The Federal Government supports extramural medical research mainly through the Department of National Health and Welfare, the Defence Research Board, and the National Research Council. The question arises as to whether or not this apparent duplication is desirable and, if so, how the activities of the agencies should be coordinated.

The first part of this question can be answered by the observation that the duplication of function is more apparent than real. The National Research Council is concerned with the development of knowledge and the training of research workers. The Defence Research Board is concerned with development of knowledge in certain restricted fields, i.e., those potentially related to defence. The Department of National Health and Welfare has functions analogous to those of the Defence Research Board, but covers a different and much wider field. The National Research Council is concerned mainly with the development of knowledge up to the level at which its bearing on practical problems becomes evident. The two other agencies are concerned chiefly with the development of knowledge to the level at which it may be directly applicable to practical problems. These are activities of essentially different emphasis. It is reasonable, therefore, that different agencies should be involved in their support. This arrangement, which prevents the domination of research by any single group, should not be lightly discarded, particularly in view of the lack of any evidence to show that a monopolistic arrangement would confer any increase in efficiency.

Having reached the conclusion that the granting functions of these agencies should be perpetuated, one should examine the terms of their co-existence. At present, informal liaison is accomplished by the attendance of the administrative officers of the agencies at the bi-annual meetings of the Medical Division of the National Research Council, and the meetings of the Defence Medical Research Coordinating Committee, and of the Advisory Committee concerned with Public Health Grants. An informal ad hoc coordinating committee has met annually in recent years, and monthly in the past year, to coordinate the medical research programmes of the various agencies. This committee has included executive officers and representatives of the Division of Medical Research of the National Research Council, the Department of National Health and Welfare, the Medical Section of the Defence Research Board, and the Department of Veterans' Affairs.

The Committee recommends that there be established an Interdepartmental Medical Research Coordinating Committee. It should be composed of representative members of the research advisory committee of each agency, i.e., the Medical Research Council (in succession to the Medical Division of the National Research Council), the Medical Section of the Defence Research Board, the Department of National Health and Welfare, and the Department of Veterans' Affairs. The membership should include an administrative officer of each agency. It might be called at the request of any component agency. It should endeavour to ensure that the Government granting bodies were following

mutually compatible lines in the development of research programmes. It could consider the extent to which a competent investigator might obtain his required support in one grant from one single agency. It might invite, on occasion, the attendance and cooperation of representatives of other agencies which support medical research. Thus it would provide opportunities for discussions of collaborative policy, simplification of administration, and interpretation of fields of interest.

IV. FINANCIAL SUPPORT

When the Division of Medical Research was set up by the National Research Council, it was decided that its entire programme should be extramural and should be channelled through the universities and their teaching hospitals. This was a wise decision. Medical research is unique in that close association with large teaching hospitals is necessary for its full development. The encouragement of research in the medical schools has engendered a spirit of searching which has permeated all departments; it has made possible the recruitment and training of young medical scientists; it has improved teaching which, in turn, has stimulated the research; it has led to notable achievements and advances in knowledge in all fields of medical science. It is the opinion of the Committee that the policy of channelling all support through the universities should be continued and that no central laboratories should be established at this time.

The great advances in science have made research complex and costly. The research facilities of our medical schools are quite inadequate, and the professional staffs of the various departments too small, to meet the challenge of the modern developments in medicine. It is important that facilities for medical research be expanded in the universities.

Reports have been received from the Deans of all the Canadian medical schools stating their present expenditures, and the estimated immediate needs for reasonable development of medical research in their respective institutions. There is a serious shortage in every university. The greatest needs are for the support of many more highly trained research workers, and for the construction of research laboratories and ancillary facilities at the universities and teaching hospitals. Large increases in funds are also needed for the support of Fellows, for routine research expenses, and for the purchase of expensive equipment.

1. Annual Budgetary Requirements

a) Operational and Equipment Grants

Grants-in-aid provide for the operational expenses of research projects and account for a large part of the present Government expenditure on extramural research. Applications to the National Research Council for the support of new projects have always exceeded the funds available - occasionally by more than 50%. This is true even though the amounts requested by individual applicants in Canada are usually very modest. In 1957-58, 168 research grants were awarded by the Division of Medical Research of the National Research Council, with an average value of \$4,600 (total value \$772,163). In the same year, the National Institutes of Health in the United States made 6,000 such awards, with an average value of \$15,000 (total value \$89,697,000)*.

* Grants and Training Awards Programs of the United States Public Health Service. J. Am. Med. Assoc. 168: 1525, Nov. 15, 1958.

As a result of the shortage of funds for research in Canada, it has not been possible to make full use of the existing research potential, nor to take the necessary steps to expand it. The most serious limitation has been in the initiation of new research. The recent increases in the budget of the Division of Medical Research have helped, but the funds available still fall far short of the amount required. During the current year, the Division found it necessary to turn down almost half of the new applications; the majority of these were considered by the Advisory Committee to be worthy of support.

b) Fellowships for Recruitment and Training

The future progress in any field of science depends on the recruitment and training of talented young people in universities. At present a medical graduate who has completed at least 7 years of university training, may receive \$2,300 as a Research Fellow of the National Research Council. This is inadequate; it is very much less than is offered for research fellowships in the United States of America; it does not encourage competent people to enter upon a life of research work. It is accordingly important to provide funds for more adequate remuneration of suitable Fellows. The total number of fellowships should be increased greatly. Opportunities for a research career in Canada should be made available in the universities and teaching hospitals to those who have demonstrated outstanding capability.

c) Provision for Increased Scientific Personnel

Canadian medical schools are grossly understaffed in comparison with those in the United States. The budget for faculty salaries in the average Canadian medical school in 1957-58 was about \$400,000; the average for 20 representative U.S. medical schools described in the Carroll Report was \$1,000,000*. The average number of full-time faculty members in Canadian schools was 49; the average in the American schools was 95. In the preclinical departments in Canada, the staff is generally too small to handle the heavy teaching load and have sufficient time for research. The present salary budgets of the medical schools do not permit additional appointments, and there is little likelihood of improvement in the near future from ordinary university revenues. Much clinical teaching is done by physicians and surgeons who make their living in practice. Many full-time clinical investigators are required.

If it were possible to appoint the number of medical scientists considered necessary by the Deans, the professional staffs of the Canadian medical schools would be increased by at least 40%, or by 240. At the average stipend paid to Medical Research Associates in 1958, this would cost approximately \$2,000,000 per annum.

* Carroll, A. J. A Study of Medical College Costs. A.A.M.C., 1958.

d) General Research Grants to Deans of Medical Schools

In 1958 the National Research Council made general grants to the Presidents of Canadian universities, to be used for research purposes at the discretion of the university. The Deans of the medical schools have asked that such fluid research grants be made available for the encouragement of research in medicine. These could be used, for example, for the support of projects which were not anticipated at the time applications were made to granting agencies, for the purchase of small pieces of equipment, for assistance in travel to scientific meetings. Provision of such fluid research funds would be of great assistance to the medical research programmes in the universities.

e) Recommendations Concerning Annual Budgets

The Committee believes that, for immediate needs and for desirable progress in research, the funds provided for extramural research by the Government of Canada, should be greatly increased within the next five years, and that the major increase should be channelled through the Medical Research Council. It is estimated that on the basis of current trends, the initial budget of the Medical Research Council should be doubled within the next three years.

The Committee recommends:-

- (i) That the Medical Research Council be given an initial budget of \$4,000,000, to provide for operating and equipment grants, research fellowships, general grants, and the support of additional scientists in medical schools;
- (ii) That the budgets for extramural support of medical research by the Department of National Health and Welfare, the Defence Research Board and the Department of Veterans' Affairs be increased progressively as required for the normal growth of their programmes.

2. Construction of Research Facilities

Every medical school has reported a grave lack of research space. The major teaching hospitals have reported a similar need. This constitutes a serious block to the expansion of medical research work in Canada.

In the last few decades the essential relationship between research and medical progress has become widely recognized. Important contributions to our knowledge of health and illness have been made through basic research in the preclinical departments. Notable advances have been made also in clinical departments, despite the limited, and often makeshift, facilities available in hospitals. If our medical scientists are to maintain and expand the progress already achieved, and if we are to offer the people of Canada the continuous improvement in medical service which they have a right to expect, additional research laboratories, buildings, and other space facilities must be provided in our universities and teaching hospitals.

Research in the special fields of medicine can no longer be carried out in small quarters at a work bench. Progress in cardiac surgery is possible only in laboratories in which work can be done on animals, in close collaboration with biochemists, physicists, and physiologists. For advances in brain surgery, experimental work requires electronic equipment, which occupies considerable space and must be carefully shielded. Investigations in various fields of internal medicine require, in addition to the usual laboratory facilities and equipment, isotope laboratories, computation centres, constant temperature rooms, small closed wards, and all the complex and expensive apparatus with which reliable information may be derived.

No local resources exist for the financing of the major research building programmes now required by every medical school. The Deans state that they have insufficient space for the existing research activities of their schools, and little or none to provide for the expansion of research which is so urgently needed. The expansion of facilities for research in medical schools and affiliated hospitals is vital to the necessary prosecution of the problems in medical science.

The Committee recommends that the sum of \$25,000,000 be provided by the Government of Canada in the next three to five years as a capital sum for the erection of new medical research laboratories in the medical schools, and \$12,000,000 for the installation of research facilities in the affiliated teaching hospitals.

V. SUMMARY

1. Introduction

Health is of primary concern to a people and its Government. In the past fifty years, the life span has been increased, infant and maternal mortality have been reduced and many diseases have been brought under control. Medical research has played a major role in these achievements which have done much to relieve human suffering and reduce the economic waste of disease. People are becoming aware of the dividends to be reaped from intensified medical research. This is reflected in the increased funds which are being made available for this purpose in many countries.

Canadians may well be proud of the reputations and accomplishments of their own medical scientists. However, Canada lags far behind the United States in its support of medical research. This is particularly serious because American universities and research institutes compete with our own for Canadian talent. It is encouraging that in each of the past two years the budget of the Medical Division of the National Research Council has been increased substantially, and that more funds have been allocated for research by the Department of National Health and Welfare. Great increases are still required.

When the Division of Medical Research was set up by the National Research Council, it was decided to channel all support through the universities and their teaching hospitals, and not to build a central laboratory. This was a wise decision. Medical research is unique in that close association with large teaching hospitals is necessary for its full development. It cannot achieve a solid foundation unless it is related to medical education. The research spirit must permeate the teaching of medicine; teaching in turn broadens the vision of the investigator. This association is essential to the recruitment and training of young scientists.

2. Federal Funds for Medical Research

The universities make a very important contribution to the cost of medical research in Canada, since in most cases they pay the salaries of the senior research workers, provide facilities and ancillary services (library, buildings, administration) and train young scientists. However, in recent years, the universities have had to depend increasingly on outside sources of support for research, in particular on the Government of Canada.

The Division of Medical Research of the National Research Council supports fundamental research and provides Fellowships. The Department of National Health and Welfare supports research on public health problems through the public health research grants, and encourages the provinces to use for research some of the funds allocated to them through the Dominion-Provincial health grants. These research grants have made a very important contribution to the whole public health programme. The Defence Research Board supports medical research of immediate

or potential defence interest. The Department of Veterans' Affairs has an active research programme in its own hospitals, which makes an important contribution to the clinical research carried out by the staffs of Canadian medical schools.

For many years these agencies have been hampered by inadequate funds and recent increases have failed to meet the advancing needs.

The Committee finds that the procedures for application for and administration of grants are, in many cases, cumbersome and wasteful of time and effort. A number of improvements in administrative procedure have been introduced recently, including outright grants, term grants and block grants; these should be more widely used by Departments of Government which support medical research.

3. Policy and Coordination

a) Medical Research Council

When the Division of Medical Research was set up by the National Research Council in 1946, it was expected that it would evolve naturally into a separate Medical Research Council. With the sympathetic support of its Presidents, the National Research Council has given increasing funds and independence to the Division until it is now almost completely autonomous. The time has come to take the final step and establish an independent Medical Research Council. This view is shared by virtually all medical research workers in Canada and those consulted in other countries. It is essential that the tremendous development in medical research which is already occurring should have the direction of such a senior body of eminent medical scientists familiar with the problems involved and commanding the respect of their colleagues. It should be directly responsible for advising the Government on policy and financial requirements for medical research, and should have the same independence and flexibility in use of funds as has the National Research Council. It should also maintain close liaison with the other Government Departments involved, and particularly with the National Research Council.

b) Research Advisory Committees

There should be, for each Department of Government which grants funds for research in medicine, an advisory committee of scientists who have had experience in medical research, to review applications and make recommendations concerning grants, and to advise the minister on those matters of policy which concern the research programme.

c) Interdepartmental Medical Research Coordinating Committee

There should be created a coordinating committee, with representatives of each of the research advisory committees, which should meet regularly to discuss collaborative policy.

4. Financial Support

The present level of support falls far short of requirements. The most obvious inadequacies are as follows:-

a) Grants

Many important projects are not supported because of lack of funds and others are restricted to only a fraction of their full development.

b) Fellowships

Present stipends for research fellowships are too low. More fellowships are required.

c) Scientific Personnel

The Canadian medical schools lack the funds to employ an adequate research staff.

d) Fluid Research Funds

There is a need for fluid research funds in the medical schools, to be administered by the Deans.

e) Research Facilities

Research space is inadequate in all medical schools; in many cases this is the most serious restriction on research development.

VI. RECOMMENDATIONS

THE COMMITTEE RECOMMENDS:

Establishment of a Medical Research Council

1. THAT a Medical Research Council be now established under terms similar to those of the National Research Council:
 - a) THAT the Medical Research Council report to the Chairman of the Privy Council Committee on Scientific and Industrial Research;
 - b) THAT the Medical Research Council advise on policy and matters relating to medical research;
 - c) THAT the Medical Research Council administer the funds allocated to it, and support and encourage the development of medical research in Canada;
 - d) THAT the Medical Research Council assume among its responsibilities those now assigned to the Division of Medical Research of the National Research Council;

Support from Other Granting Bodies

2. THAT the present extramural medical research programmes of the Department of National Health and Welfare, the Defence Research Board, and the Department of Veterans' Affairs be continued in their own special fields of interest, with such progressive increases as may be required for the normal growth of these programmes;

Research Advisory Committees

3. THAT for each of these Government agencies, there be an advisory committee of scientists who have experience in medical research, to advise on matters of policy and make recommendations concerning awards of grants for research;

An Interdepartmental
Medical Research Co-
ordinating Committee

4. THAT an Interdepartmental Medical Research Coordinating Committee be set up, consisting of representatives of these advisory committees and appropriate executive officers, to facilitate coordination of the research policies and activities of these agencies;

Simplification
of Procedure

5. THAT the procedures for the administration of grants be as simple as possible, consistent with the specific terms of the granting body; that term grants be made to established investigators to assure continuity of support; and that grants be made outright, allowing flexible use of funds;

Budget of the
Medical Research
Council

6. THAT the budget of the Medical Research Council be \$4,000,000 for 1960-61, and that substantial annual increments be provided to meet the increased operational costs and inevitable growth of medical research; to provide adequate funds for an expanded programme of fellowship training; to provide salaries for additional research workers in the universities, and to make substantial general grants to the medical schools;

Construction Grants

7. THAT funds be made available for the construction of urgently needed research buildings and facilities in the medical schools of Canada and affiliated institutions. It is estimated that \$25,000,000 is required now for this purpose by the medical schools, and \$12,000,000 for research facilities in the affiliated teaching hospitals.



Table 1

FEDERAL SUPPORT FOR EXTRAMURAL MEDICAL RESEARCH, 1946-1960

Year	Extramural medical research expenditure by Government of Canada				Gross national product*	Extramural research support as percentage of G.N.P.
	National Research Council	Dept. of National Health and Welfare	Defence Research Board	Dept. of Veterans' Affairs		
	(\$ thousands)				(\$ billions)	
1946-47	158				158	
1947-48	271				271	
1948-49	357	150	40		547	0.0036
1949-50	498	326	113		937	16.34
1950-51	539	720	179	1	1,439	0.0080
1951-52	578	959	542	0	2,079	0.0098
1952-53	617	1,248	357	2	2,224	0.0093
1953-54	642	1,639	380	2	2,663	0.0106
1954-55	652	1,600	365	1	2,618	0.0105
1955-56	693	1,554	404	2	2,653	0.0098
1956-57	849	1,740	419	1	3,009	0.0100
1957-58	894	1,937	373	18	3,222	0.0103
1958-59	1,523	2,000	409	17	3,949	0.0123
1959-60 (est.)	(1,970)	(2,568)	(412)	(9)	(34.0)	(0.0145)

* "National Accounts - Income and Expenditure, 1926-1956", Dominion Bureau of Statistics, Ottawa, 1958, p.33; and "Canadian Statistical Review", August, 1959, p.6.

Table 2

COMPARATIVE EXPENDITURES ON MEDICAL RESEARCH
BY CERTAIN AGENCIES IN THE U.S., U.K., AND SWEDEN

A. United States of America - National Institutes of Health *

Year	Gross national product**	National Institutes of Health expenditures (extramural project grants & fellowships***)	Extramural N.I.H. expenditures as percentages of G.N.P.
	(\$ billions)	(\$ millions)	
1948	259	9.7	0.0037
1949	258	12.0	0.0046
1950	285	14.5	0.0051
1951	328	18.3	0.0057
1952	347	19.9	0.0057
1953	365	22.4	0.0061
1954	363	31.0	0.0085
1955	397	36.5	0.0092
1956	419	40.8	0.0097
1957	443	98.7	0.0223
1958	442	108.2	0.0245
1959 (est.)	(475)	(165.8)	(0.0349)
1960 (est.)		(217.5)	

* Some support for extramural medical research is provided by the National Science Foundation, the Department of Defence, and the U.S. Atomic Energy Commission, but most of such aid is provided by the National Institutes of Health.

** "Survey of Current Business", U.S. Dept. of Commerce, July, 1959, p.7.

*** "The Advancement of Medical Research and Education through the Department of Health, Education and Welfare. Final Report of the Secretary's Consultants on Medical Research and Education". Office of the Secretary, Dept. of Health, Education and Welfare, Washington, D.C., June 27, 1958, p.57; and personal communication to the Committee from Dr. E.M. Allen, Chief, Division of Research Grants, National Institutes of Health.

Table 2 (cont'd)

B. United Kingdom - Medical Research Council

Year	Gross national product* (£ billions)	Medical Research Council expenditures ** (£ millions)	M.R.C. expenditures as percentage of G.N.P.
1948		1,135	
1949		1,535	
1950	13.26	1,659	0.0125
1951	14.64	1,903	0.0130
1952	15.86	1,898	0.0120
1953	16.92	1,806	0.0107
1954	17.97	1,947	0.0108
1955	19.15	2,268	0.0118
1956	20.73	2,357	0.0114
1957	21.92	2,813	0.0128
1958		3,137	(est.)(0.0143)

* "Yearbook of National Accounts Statistics, 1958", Statistical Office of the United Nations, New York, 1959, p.256. (Figures adjusted for international comparison.)

** Appropriations by Parliament to the Medical Research Council for grants-in-aid of medical research. This represents approximately 50% of the Government's total contribution to extramural medical research.

Table 2 (cont'd)

C. Sweden - Medical Research Council*

Year	Gross national product**	Medical Research Council expenditures ***	M. R. C. expenditures as percentage of G. N. P.
	(Sw.kr. billions)	(Sw.kr. millions)	
1948		1.05	
1949		1.19	
1950	28.74	1.10	0.0038
1951	35.28	1.19	0.0034
1952	38.63	1.41	0.0037
1953	39.48	1.60	0.0040
1954	41.91	1.60	0.0038
1955	45.24	2.11	0.0047
1956	48.80	2.61	0.0053
1957	52.59	3.25	0.0062
1958		4.06	(est.) (0.0078)*

* Only about 15% of the Swedish Government's total contribution to medical research is channelled through the Medical Research Council.

** "Yearbook of National Accounts Statistics, 1958", Statistical Office of the United Nations, New York, 1959, p.255.

*** Forskningens Villkor Och Behov. 1955 Ars Universitetsutredning, Statens Utredningar 1958: 32, Stockholm, 1958, p.144.

Fig. I

Expenditure for Extramural Medical Research
by the Government of Canada.
(Millions of Dollars.)

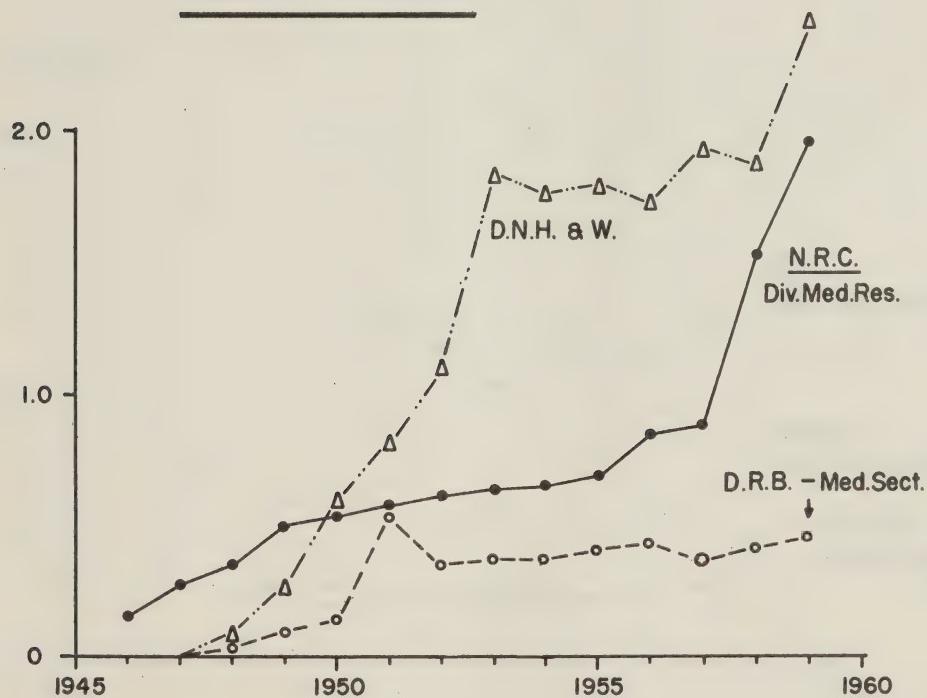


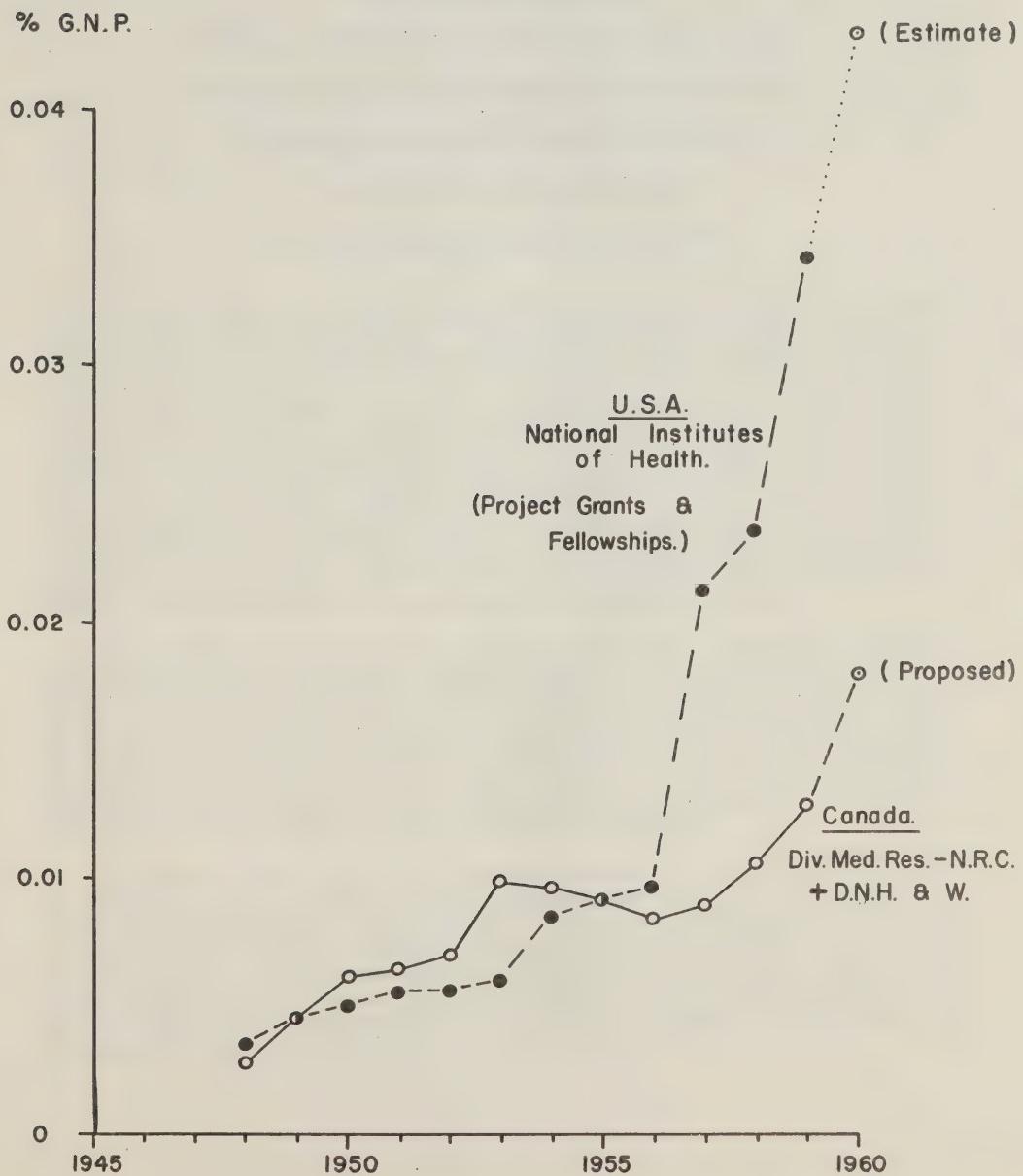
Fig. 2

Comparative Expenditures
as % of Gross National Product.



Fig. 3.

Comparison of Expenditures for Extramural
Medical Research as % of Gross National Product.



APPENDIX A

A brief on the funding of Medical Research in Canada

respectfully submitted by

The Association of Canadian Medical Colleges to the:

Honourable the Minister of National Health and Welfare

Honourable the Minister of Trade and Commerce

Honourable the Minister of Defence

Honourable the Minister of Veterans' Affairs

Medical research in Canada began about a generation ago and has expanded greatly since the Second World War. The major part of the financial support for this expansion has come from Governmental sources, but in recent years the financing has not kept pace with the need. Not only has the amount of research increased in the older medical schools but three new schools have been established and the rate of increase has been accelerated. The part played by the Federal Government in these developments in research has been described by Dr. Basil B.D. Layton in an article in the Canadian Medical Association Journal in April of this year. Dr. Layton points out that from the end of the war to the year 1952 medical research funds from all sources increased by 125% but the subsequent increase has amounted to only 25%. The amount of Dominion-Provincial health grants, which represent more than 50% of the Federal money available to universities for grants and fellowships, has remained practically stationary since 1953.

Dr. Layton's report does not indicate the difference between the available support and the total of reasonable requests which have come to the granting bodies; for the past three years this has amounted to about \$1,000,000 per annum. For the past ten years the National Research Council has never been able to make grants for all of the applications it would like to have approved. This year its funds are short by \$547,251 of the total of applications so far received, with more to come; For three years its allocation has been nearly 40% below the sum of the applications; this year the allocation will be more than 70% short.

It must be realized that the development of medical research cannot be based on short-term policy. Research workers need time to build up staff and equipment and to develop their ideas. This demands a longer view and sustained support. A steadily developing policy of support is much better than alternations of large and curtailed grants. Curtailment has actually taken place, because the growing costs of maintaining projects has not been paralleled by a proportionate increase in the funds available. No creditable research programme is static. It must grow, and it cannot grow without nourishment.

The conventional method of making awards is on an annual basis, following applications which have been carefully reviewed by competent referees. A large proportion of the grantees are experienced investigators who are so unsure about the outcome of their applications that they remain in a state of uncertainty for about three months every year and are consequently unable to make plans and to proceed with confidence. A majority of these workers could be helped more efficiently by grants on the basis of three to five years. There is a great demand in all universities for this type of support now available to a limited extent only through the National Research Council and the Defence Research Board. The National Research Council now awards consolidated grants in the amount of \$237,500. These have given great satisfaction to the grantees and to the Council and the pattern ought to be adopted by the other Governmental granting bodies.

Such a pattern would provide continuity and stability of scientific work in a laboratory. To provide similar stability for senior research workers, the National Research Council has recently instituted the associateships which have won such wide acclaim, but the money available for this purpose is much too little to attract to the universities the gifted men trained in research who are now drifting into industry or practice, or are vanishing south of the U.S.-Canadian border.

Recruitment of junior workers is so serious a problem that progress in medical research may well be halted unless a solution is found, and found soon. A pre-fellowship programme is required and the money for grants-in-aid is sadly insufficient. The stipends for fellowships are now too low to attract the best young medical graduates, of whom the majority have family responsibilities.

It is most important that some means should be found of providing money for the building of research facilities. The Department of National Health and Welfare has given generous assistance in the equipping of research laboratories in the Canadian medical schools but there is literally no source of money for the building of laboratories save through the general fund-raising campaigns of the universities. The United States Public Health Service has recently undertaken to provide such assistance for American institutions. In Canada such funds are badly needed. Few modern medical research laboratories exist in the universities which may be compared with the facilities of pharmaceutical and other industries.

Most of the applications made to Federal granting agencies by Canadian universities are now refereed by scientists in the Canadian medical schools. These scientists should be capable of assessing the applications of their colleagues on the spot. The applications are at present required to be submitted from three to five months in advance of the time of award and in this long interval new problems may arise for which investigators cannot expect support for another fifteen months. This has proven to be a great hardship and could be overcome if a block grant were given to a university for its own administration.

The complexity of the problems which face Canadian medical science precludes any glib detailed proposals. Governmental and voluntary agencies share the field, and this is an opportune time for a thorough-going investigation of how these various agencies could cooperate to the best advantage. It is respectfully requested that a high-level committee should be set up at once to study these problems and that the Association of Canadian Medical Colleges should be represented on this committee.

In the meantime there is urgent need of assurance that for the coming year there will be available for medical research an increase of at least \$500,000, which we would like to see added to the budget of the Medical Research Division of the National Research Council, without reduction in the sums available to the other granting bodies.

Ottawa, 12 November, 1957.

APPENDIX B

Summary* of a memorandum presented to the Parliament of Great Britain in 1919

by Christopher Addison, who later became its first Minister of Health:-

"In this it was pointed out that a progressive Ministry of Health must necessarily become deeply committed from time to time to particular policies of health administration and that, if the medical research organizations were placed directly under the minister, it might find itself constrained to keep in step with the ministry's current policies, instead of being entirely at liberty to recommend alterations of those policies in the light of new knowledge; its activities, moreover, might tend to be undesirably limited to the study of 'those problems which appeared at the moment to be of the most practical importance' from the point of view of the ministry's executive functions, to the exclusion of the more fundamental studies upon which all advances in knowledge of short-term practical problems must ultimately be based, and which of themselves have so often been found to lead suddenly and unexpectedly to new advances in the practice of medicine. Such a myopic view of the functions of medical science could best be avoided by leaving the promotion of medical research in the hands of the relatively autonomous body of scientific experts which had already proved its value, and which should be given (in the words of the memorandum) 'the widest possible freedom' to make new discoveries within its field, and to make them available for the use of any or all of the executive government departments, and of the medical profession, without regard to questions of political or administrative expediency."

* Green, F.H.K. The Constitution and Functions of the United Kingdom Medical Research Council. Science, 116: 99-105, 1952.

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